



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/556,777	04/25/2000	Akira Goda	0039-7692-2S	8088

7590 07/03/2002

Oblon Spivak McClelland Maier & Neustadt PC
1755 Jefferson Davis Highway
Fourth Floor
Arlington, VA 22202

EXAMINER

SOWARD, IDA M

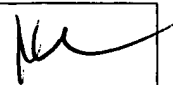
ART UNIT

PAPER NUMBER

2822

DATE MAILED: 07/03/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/556,777	GODA ET AL. 	
	Examiner	Art Unit	
	Ida M Soward	2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) ____ is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☐ Claim(s) ____ is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____. | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to the amendment filed on April 10, 2002.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 3 and 5 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Iwahashi et al. (4,495,693) in view of Gonzalez (US 2001/0002711 A1).

Iwahashi teaches a nonvolatile semiconductor memory device (abstract) comprising: a semiconductor substrate (Fig. 11L, Ref. # **128**); a first transistor formed in a peripheral circuit portion **166** of the semiconductor substrate, the first transistor including source **142a** and drain **140a** diffusion layers formed in one of the plurality of element regions and a gate electrode **138a** having a first gate length; a second transistor including source **132a** and drain **130a** diffusion layers formed in another plurality of element regions and a gate electrode **122a** having a second gate length **122** shorter than the first gate length **138a**; a first insulating film **158** formed above at least the memory cell portion, the first insulating film covering the second transistor; an element isolation

Art Unit: 2822

region **144a** formed in the semiconductor substrate, the element isolation region isolating a plurality of element regions in the semiconductor substrate; a contact connected to one of the source and drain diffusion layers (Figure 15); . Also, the limitations of the first insulating layer having a property that makes it difficult for an oxidizing agent to pass therethrough and the gate electrodes being oxidized are inherent in the art of semiconductor devices. One of the purposes of insulating layers is to protect the device from such oxidizing agents as oxygen and ozone. In addition, gate material and other material become oxidized when exposed to the atmosphere. However, Iwahashi et al. fail to teach a first insulating film different from silicon oxide. Gonzalez teach a first insulating film **30** different from silicon oxide (Figure 4, page 3, paragraph [0037]. Gonzalez further teaches a metal **41** formed in a insulating film **30**. In regard to the etch stopper, note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA; In re Marosi et al., 218 USPQ 289 (CAFC); and most recently, In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases as the above case law makes clear. Therefore, it would have been obvious to one having

Art Unit: 2822

ordinary skill in the art at the time the invention was made to modify the structure of Iwahashi et al. with the first insulating film of Gonzalez to decrease operating voltages.

Claims 11, 14 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwahashi et al. (4,495,693) and Gonzalez (US 2001/0002711 A1) as applied to claims 1-2, 3 and 5 above, and further in view of Chang et al. (4,769,340) and Yokoi et al. (4,866,003).

Iwahashi et al. and Gonzalez teach all mentioned in the rejection above. Chang et al. teach erasable and programmable memory cell transistors (abstract). Yokoi et al. teach an insulating film **7** used as an etching stopper when contact holes **8 & 9** are formed, a silicon nitride film **12** covering the transistor, and a concentration of hydrogen in the silicon nitride that is smaller than 3×10^{21} atom/cm³ (col. 3, lines 37-41). However, Iwahashi et al. fail to teach these limitations. Also, it is well known in the semiconductor art for the concentration of an impurity to be higher at the surface and decreases deeper into the material. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the structure of Iwahashi et al. and the first insulating film of Gonzalez with the memory cell transistors of Chang et al. and the insulating film of Yokoi et al. to provide a semiconductor device which is free from the deterioration in device characteristics due to hot carriers by having a reduced amount of hydrogen in the silicon nitride film.

Claims 12-13 and 21-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwahashi et al. (4,495,693), Gonzalez (US 2001/0002711 A1), Chang et al. (4,769,340) and Yokoi et al. (4,866,003) as applied to claims 1-2, 3 5, 11, 14 and 19 above, and further in view of Saito et al. (4,467,452) and Tseng (5,731,130). Iwahashi et al. Gonzalez, Chang et al. and Yokoi et al. teach all mentioned in the rejection above. However, Iwahashi et al. Gonzalez, Chang et al. and Yokoi et al. fail to teach a silicon nitride film having a thickness of at most 50 nm and an oxide film on the surface of the silicon nitride film having a thickness. Saito et al. teach a silicon nitride film **66** having a thickness ranging from 40 to 60 nm (col. 6, lines 53-62) in which 50 nm is included. Tseng teaches the oxidation of a silicon nitride film **40** with a preferred total thickness of about 1 to 10 nm (col. 8, lines 42-49). Thus, an oxide film not smaller than 1 nm and not larger than 10 nm could have been formed from the teachings of Tseng. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the structure of Iwahashi et al., the first insulating film of Gonzalez, the memory cell transistors of Chang et al. and the insulating film of Yokoi et al. with the oxidation of the silicon nitride films of Tseng and the silicon nitride thickness of Saito et al. to provide a nonvolatile memory device with an excellent storage retention time.

Response to Arguments

Applicant's arguments with respect to claims 1-3, 5, 11-14 and 19-25 have been considered but are moot in view of the new ground(s) of rejection.

Art Unit: 2822

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M. Soward whose telephone number is (703) 305-3308. The examiner can normally be reached on Monday through Friday, from 7:30 am to 4:00 pm.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr. can be reached at (703) 308-4940. The Group fax number is (703) 308-7722.

Art Unit: 2822

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

ims

6/27/02


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800